ATOC 7500-001, Fall 2006
Sessions 3.1-3.5

Instructor: Dr. Tomislava Vukicevic
Associate Research Professor
Atmospheric and Oceanic Sciences
e-mail: tomislava.vukicevic@colorado.edu

HOMEWORK #2
Due September 25 2006

Problem 1:
Compute posterior marginal distribution in space of model parameter for the damped oscillations model. The measurements are to be generated by the model "true" solution to which random Gaussian "errors" are added. The programs for running the model and generation of distributions are in Exercises_Section_3.tar file. The driver program is run_generic_do.m.

Compute the posterior distribution assuming that the measurements are made at 100-th time step of the model simulation. Do the problem for the damping coefficient control parameter in two cases:
   a) **assume that the prior distribution is lognormal** LN(mean,variance), which accounts for positive definite nature of the parameter
   b) **assume that the prior distribution is normal** with the same mean and variance (this is the same as Exercise 8 done in the class).

Display joint distributions in graphical form (2D contours). Write conclusions about difference between assuming normal and lognormal distribution for the prior.

Problem 2:
Same as problem 1b (Gaussian prior) but instead computing the model joint distribution $p_2(m, y)$ from the model simulations with noninformative prior (as in Exercise 8), assume that $p_{2y}(y/m)$ is Gaussian with a **sensible** mean and variance. Use at least 2 sets of values for the mean and variance to see how it affects the posterior marginal distribution.